What is claimed is:

1. An apparatus for avoiding vehicle collisions comprising:

a forward-looking sensor generating a forward-looking signal corresponding to the relative positions between a host vehicle and a target object;

a yaw rate sensor generating a yaw rate signal corresponding to the angular position of said host vehicle relative to said target object; and

a controller electrically coupled to said forward-looking sensor and said yaw rate sensor, said controller receiving said forward-looking signal and said yaw rate signal, said controller including control logic operative to predict the probability density function for the position of a vehicle at several future occasions, predict the probability density function for the position of said additional object at several future occasions, form the joint probability density function for the relative positions of the vehicle and object at said several future occasions, and integrate the joint probability density function over the area in which the vehicle and the object are in physical conflict based upon said forward-looking signal and said yaw rate signal.

2. The apparatus as recited in claim 1, wherein said target object is a vehicle.

3. The apparatus as recited in claim 1, wherein said object is a fixed object.

4. The apparatus as recited in claim 1, wherein the probability density function is predicted for several vehicles, fixed objects and moving objects.

5. The apparatus as recited in claim 1, wherein said forward-looking signal corresponds to the total width and length of the vehicle and the object.

6. The apparatus as recited in claim 1, wherein said probability density function is approximated with the Gaussian normal distribution.

7. The apparatus as recited in claim 1, wherein the probability density function is calculated using the Kalman filter.

8. The apparatus as recited in claim 7, wherein the Kalman filter is used to calculate the covariance matrix of the vehicle and the object.

9. The apparatus as recited in claim 1, wherein the method also comprises the step of taking a suitable cause of action for the specific situation.

10. A method for avoiding vehicle collisions comprising the steps of:

generating a forward-looking signal corresponding to the relative positions between a host vehicle and a target object;

generating a yaw rate signal corresponding to the angular position of said host vehicle relative to said target object;

predicting the probability density function for the position of a vehicle at several future occasions;

predicting the probability density function for the position of said additional object at several future occasions;

forming the joint probability density function for the relative positions of the vehicle and object at said several future occasions; and

integrating the joint probability density function over the area in which the vehicle and the object are in physical conflict based upon said forward-looking signal and said yaw rate signal.

11. The method as recited in claim 1, wherein said target object is a vehicle.

12. The method as recited in claim 1, wherein said object is a fixed object.

13. The method as recited in claim 1, wherein the probability density function is predicted for several vehicles, fixed objects and moving objects.

14. The method as recited in claim 1, wherein said forward-looking signal corresponds to the total width and length of the vehicle and the object.

15. The method as recited in claim 1, wherein said probability density function is approximated with the Gaussian normal distribution.

16. The method as recited in claim 1, wherein the probability density function is calculated using the Kalman filter.

17. The method as recited in claim 7, wherein the Kalman filter is used to calculate the covariance matrix of the vehicle and the object.

18. The method as recited in claim 1, wherein the method also comprises the step of taking a suitable cause of action for the specific situation..